RESEARCHES CONCERNING THE SUITABILITY OF VINE PRODUCTION ON SOME LANDS FROM SIDE OF THE COVURLUI HILLS

CERCETĂRI PRIVIND PRETABILITATEA PENTRU CULTURA VIŢEI DE VIE A UNOR TERENURI DIN ZONA COLINELOR COVURLUI

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Abstract. *This paper intends to determine soil availibility for vine culture in some areas in the eastern part of the Covurlui Hills by showing the soil quality in the cadastral area of Cavadinesti. Due to various natural conditions, the soils in this area are quite varied in as far as their fertility and production capacity are concerned. As a result, soil and land quality determination and evaluation have a great importance. Through its geographical position, the land under analysis belongs to the great geographical unit of the Covurlui hilly region which is characterized by a great variability of the environmental factors that contribute to the plant growth. In this context, the ecopedological evaluation is compulsory, being required by the sustainable development of viticulture. On the land of the village, N soil units have been defined and grouped under the following categories: protisols, antrisols and chernisols.*

Key words: quality, fertility, soil suitability, vine.

Rezumat. *Lucrarea de faţă are ca obiectiv determinarea pretabilităţii pentru cultura viţei de vie unor terenuri din extremitatea estică a Colinelor Covurlui resursele, pe teritoriul cadastral al comunei Cavadineşti. Formate în condiţii naturale variate, solurile din zona respectivă diferă foarte mult ca însuşiri de fertilitate, respectiv capacitate productivă. Prin poziţia sa geografică, teritoriul luat în studiu aparţine marii unităţi geografice Colinele Covurluiului, caracterizată printr-o mare variabilitate a factorilor de mediu care concură la realizarea condiţiilor de mediu în care cresc şi rodesc plantele. În acest context cunoaşterea ecopedologică apare ca o necessitate obiectivă, cerută de realizarea unei viticulturi durabile. Pe teritoriul comunei s-au delimitat unităţi de sol grupate în următoarele clase şi anume: protisoluri, antrisoluri şi cernisoluri.*

Cuvinte cheie: calitate, favorabilitate, fertilitate, pretabilitate, viţa de vie

INTRODUCTION

The use and the rational and efficient management of the land resources in our country as well as their improvement , protection and conservation , in the context of a sustainable agriculture, may be achieved only by knowing the soil resources perfectly. This information can be obtained only by means of various pedological studies and researches that add to the total pedological info (Teaci D., 1980).

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Plant cultivation can't be conceived without the presence of soil, which is the main agricultural resource and a real material support for the plants. Both the quality and quantity of the crops depends upon the type of soil, its content in nutrients, by its capacity to retain water (Chiriţă C.D, 1984).

This research has as its major aims the delimitation, the inventory and the evaluation of soil resources , the delimitation and inventory of the limitative and restrictive factors in using the plots for agricultural purposes and their availability for agricultural activities.

MATERIAL AND METHOD

The topographical pattern we used during this research is represented by several 1:10000 scale topographical plans, As a result, 192 profiles, 20 main profiles and 172 secondary .

This paper has been done in accordance with the Romanian System of Soil Taxonomy , 2003 and the Methodology for Elaborating Pedological Studies, edited by ICPA in 1987 (Florea N., Bălăceanu V., Răuţă C., Canarache A. and all,1987).

Ecopedological indicators are taken into the study presented in table 1.

Table 1

Ecopedological indicators legend (vol.III - MESP-ICPA, 1987)

The Indicator	
3C Average annual temperature	44 Total porosity
4C Average annual precipitation	61 $CaCO_3$ Content
23A Texture in Ap	63 Soil reaction (Ap or 0-20 cm)
23B Textura in depth	69 Degree ob base saturation
33 Slope of land	133 Edaphic useful volume
34 Exposition	144 Storage humus
38 Landslide	181 Waterlogging
39 Depth of ground water	

We have established the limitative factors of production and measures have been suggested to eliminate them and also prevent soil degradation through anthropic land processing.

RESULTS AND DISCUSSIONS

1. Geographical Position

Relief. This study was performed on the cadastral area of the Cavadinesti Village which is placed on the Cavadinesti Plateau, fragmented by flat peaks and platelands, separated by parallel valleys. The geomorphological elements of the main form of relief are interfluves, slopes and valleys.

Surface Deposits Litology. The foundation of this region is North-Dobrudgea hercinic-kimmeric christalline schists and paleozoic, triasic and liasic sediments waved during the old hercinic and kimmeric orogenesis (V. Sfinclea, 1980). To the west of the Horincea Valley, the soils are solification rocks like loessoid Quaternary deposits. On the very steep slopes where erosion has eaten up

the layer of Quaternary deposits, neogen deposits replace them, as sandy materials. To the east of the Horincea Valley, the solification rocks are represented by clayey, marly and loessoid deposits. Along the narrow valleys , the solification rocks are represented by alluvio- colluvial deposits of recent age. In the Elan and Prut meadows the solification rocks made up of fluvial deposits of fine texture are predominant here.

Hydrography and Hydrology. The hydrographic network belongs to the Prut River Basin . The Prut waters have an average mineralization, characteristic to the carbonated-bicarbonated waters.The Elan, The Horincea and The Liscovat have a torrential behavior, their discharges varying according to the amount of falling rain. Floods are frequent on the Elan valley. Phreatic waters are present as aquiferous layers at 20-30 meters in depth on interfluves and at 1-3 meters deep on the alluvial regions of meadow lands which influence soil evolution processes through gleization. On the slopes many side springs rise, creating areas of swamps and water bogging .The water in excess here produce pseudogleization processes.

The Climate. The climatic characterization of this region was done after the data registered by the Barlad Meteo Station during 1950-2007, according to ANM Bucharest. The annual average temperature is 9.7^0 C, while the sum of the temperatures higher than 10^0C during vegetation time is 1436.5^0 C. Multiannual potential evapotranspiration is 677 mm, while the annual average rainfalls represent 516.2 mm. Air relative wetness (UR%) has an average annual value of 78.1%, while sun brightness duration (insolation) presents an average annual value of 1828 hours. Wind average speed is 3.3m/sec.

The Vegetation. The Cavadinesti region is mainly ante-steppe, characterized by xerophile woods with meadows and grassy vegetation clusters.The wood vegetation is represented by groups of *Robinia pseudocacia,* very rarely *Quercus robur* mixed up with *Ulmus campestris* and *Carpenus betulus*. Small trees are present, too: *Prunus spinosa, Crataegus monogina*, *Rosa canina*, while the grassy vegetation is represented by *Festuca vallesiaca, Bromus erectus, Stipa capilata, Carex* sp. etc. The ruderal vegetation is present as *Cirsium arvensis*, *Convolvulus* sp., *Amaranthus retroflexus, Brasica nigra.*

In the Elan and Prut meadows, a type of vegetation, characteriastic to swamps and pools is also to be found here: *Typha latifolia, Potamogeton pusillus L., Ranunculus cassubicus L.*

The main cultures in the area are wheat, barley, corn, sunflower, soya, sugar beet, beans and vine.

2. Soil Characterization

The soils have been characterized after their morphological description and physico-chemical traces (Florea N., Munteanu I., 2003). On the Cavadinesti cadastral area, 49 soil units have been isolated, grouped into the following classes: Protisols (Regosols, Alluviosoils), Antrisols (Erodosols) and Chernisols (Chernozems, Faeozioms).

An area of 690.32 ha is occupied by Protisols. As a result of researches, a *Calcaric regosol* (**RS ka**) has been identified, being present on pasture lands, of middle texture, well-developed grainy structure,an intense biological activity, with an At-Ck type profile, having the following soil formula:

$$\text{RS ka} \quad \frac{\text{X42/k1 - Tem - l/l - Ps}}{\text{D - ULPNBmr12r22f32Q7}} \text{ (1),}$$

The lands under analysis belong to the 4th class of usability for vines according to Annex 7-1 of the instructions ellaborated by ICPA, Vol II, 1987.

Alluviosoils occupy an area of 391.7 ha and they are present in the Prut Meadows and the holms of The Elan, The Horincea, The Oarba and The Liscovat brooks. They have a Am-C profile and they are also supplied with water in abundance and are base-saturated, but the nutrient supply is low to medium.

They follow this pattern:

$$\text{ASkamo} \quad \frac{\text{k1 - Tfm - t/t - A}}{\text{D - SJ P01 - 0NB Q5}} \text{ (2)}$$

The lands of this category enter the 4th class of usability for vines, according to ICPA, Vol.II, 1987.

An area of 93.6 ha is occupied by *aluvio**sol* (**AS**) *calcaric* (**ka**) *gleic* **(gl)** *coluvic* **(co)**, with medium texture, low in humus and nutrient supply. It has an Amp-Am-C profile and it shows the following soil formula:

$$\text{ASka gc co} \quad \frac{\text{G3k1 - Spm - t/l - Ar}}{\text{D - IS P03 - 0 NBm Q5}} \text{ (3)}$$

The lands within this area enter the 4th class of usability for arable lands, according to Annex 7-1 from ICPA statements.

An area of 4585.03 ha is occupied by *typical calcaric(Cz*ti, ka*)*, *cambic chernozems(CZcb)* with a, Am-AC-C or Am-AB-Bv-Ck type of morphology. The texture is medium , they are spongy with a very good permeability for both water and air.They can be used for a large variety of cultures that require moderate irrigation.They present the following formula:

$$\text{CZ ti} \quad \frac{\text{k3 - Tem - s/l - Ar}}{\text{D - UL P12 - 4NB m Q7}} \text{ (4)}$$

$$\text{CZka Xad} \quad \frac{\text{k1 - Tem - l/l - Vn}}{\text{D - UL P12 - 4 NBm Q7}} \text{ (5)}$$

$$\text{CZ cb} \quad \frac{\text{Xad k3 - Teg - s/u - Vn}}{\text{D - UL P12 - 2 NBgQ7}} \text{ (6)}$$

For the area occupied by the calcaric and cambic chernozem, a 3rd class of usability can been used for vine. Symbols used are found in "*Methodology of Elaborating Pedological Studies" (1987).*

The inclusion in classes of quality, according to the bonitation notes, calculated after ICPA , Vol II, 1987 methodology, the plots analyzed enter the following classes of quality, as we see in table 2.

Table 2

Land Classification in Classes of Quality

TEO*	Area-ha	Bonitation note	Class
50	28,79	40	IV
53	37,18	27	IV
54	46,95	40	IV
55	37,27	27	IV
56	40,14	22	IV
57	29,28	20	V
58	13,70	12	V
95	13,36	62	II
96	23,97	59	III
97	36,18	38	IV
100	76,63	32	IV
101	16,68	43	III
103	22,81	18	V
106	32,94	46	III
107	13,44	38	IV
161	92,77	45	III

*TEO- homogeneous ecological area

3. Esteblishing of classes of usabilityfor the limitative and restrictive factors

The values of the ecological factors have been analyzed in accordance with their favorability for vine growing. According to ICPA (1987), 6 classes of favorability for this culture have been established, as shown in table 3.

Table 3

Classes of favorability for vine growing

TEO	Bonitation note	Class	The limitative and restrictive factors
50	40	VII	Climate and soil
53	27	VIII	Climate and soil
54	40	VII	Climate and soil
55	27	VIII	Climate and soil
56	22	VIII	Climate and soil
57	20	IX	Climate and soil
58	12	IX	Climate and soil
95	62	IV	Climate and soil
96	59	V	Climate and soil
97	38	VII	Climate and soil
100	32	VII	Climate and soil
101	43	VI	Climate and soil
103	18	IX	Climate and soil
106	46	VI	Climate and soil
107	38	VII	Climate and soil
161	45	VI	Climate and soil

From the data above we may conclude that no homogeneous ecological territory unit (TEO) ever have conditions of high or extra high favorability. Average conditions of favorability are present in TEO 95, 96, 101, 161, the main limitative factors being the annual average temperature, the average annual rainfalls, the soil hydrophisical indices and the humus content as well.

CONCLUSIONS

To cultivate vines successfully in this area it is necessary to make a qualitative and quantitative analysis of soil resources and take measures for the improvement of their productive capacities.

If we think that the restrictive factors for vine growing are the climate and the soil, the application of 1st year waterings and the fertilization on the spot while planting the cuttings.

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